CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: July 25, 2001 FILE REF:

TO: Caroline Garber – AM/7

FROM: John Roth – AM/7

SUBJECT: Wisconsin DNR Hazardous Air Pollutant Threshold Modeling

INTRODUCTION

The Bureau of Air Management is in the process of updating the threshold emission rates for hazardous air pollutants listed in Chapter NR 445, Wis. Adm. Code. Part of the procedure involves using dispersion modeling to estimate impacts from various types of sources, converting these impacts into emission rates that will meet the air quality standards, and developing restrictions on the use of these threshold rates.

MODELING PARAMETERS

1. Four stack heights were considered in this analysis: 11.5 foot, 25 foot, 40 foot, and 75 foot above ground level. The stack diameters, gas exit velocity, and gas exit temperatures were the same for all four stacks. The stacks were analyzed individually so threshold rates could be established by stack height. Impacts from multiple stacks were not considered.

2. Twenty years of preprocessed National Weather Service (NWS) data were used in this analysis. Surface data was collected at the Eau Claire airport (1982-1986), the Green Bay airport (1983-1987), the Madison airport (1975-1979), and the Milwaukee airport (1982-1986). Concurrent upper air data was collected at the Green Bay NWS office and at the St. Cloud, Minnesota NWS office.

3. Both urban and rural dispersion coefficients were used in this analysis, and the higher of the two concentrations were used to compute the threshold emission rates. The higher the concentration in this analysis, the lower the threshold rates.

4. The Industrial Source Complex Short-Term 3 model (ISCST3) was also used in this analysis. The regulatory default option was selected, which allows for building downwash, buoyancy-induced dispersion, and calm wind corrections. This option does not consider any chemical effects.

5. Receptors were placed in a rectangular grid surrounding the stack with one-meter resolution and extending 100 to 200 meters from the source to find the highest concentrations. Terrain elevations were not considered in this analysis.

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NR 445 THRESHOLD MODELING STACK PARAMETERS				
	<25' Stack	**25'-40' Stack**	**40'-75' Stack**	**>75' Stack**
Stack Height (ft)	11.5	25.0	40.0	75.0
Stack Height (m)	3.51	7.62	12.19	22.86
Stack Diameter (ft)	1.00	1.00	1.00	1.00
Stack Diameter (m)	0.31	0.31	0.31	0.31
Exit Gas Velocity (m/s)	6.47	6.47	6.47	6.47
Exit Gas Temp (K)	293.0	293.0	293.0	293.0
Building Height (m)	3.05	6.10	9.75	18.29
Building Width (m)	10.00	10.00	19.50	36.58
Emission Rate (#/hr)	1.00	1.00	1.00	1.00

MODELING RESULTS

The table below summarizes the results of the dispersion modeling analysis to establish threshold emissions rates. These emission rates should not be used if the source has a horizontal or obstructed discharge, or if terrain elevations that are more than 25% of the discharge height exist within 300 meters (1000 feet) of the stack. Please note that the concentrations provided also do not include chemistry, terrain elevations, or multiple stacks, and are the highest of the results from either the urban or rural cases.

NR 445 THRESHOLD MODELING SUMMARY OF RESULTS (All Concentrations in :g/m3)				
	<25' Stack	**25'-40' Stack**	**40'-75' Stack**	**>75' Stack**
1 Hour Concentration	1,339.2	420.5	218.7	81.5
24 Hour Concentration	446.8	115.0	57.0	14.8
Annual Concentration	49.3	12.0	5.04	1.43